Biometry and plasmatic stress-related parameters in brill (*Scophthalmus rhombus*) cultured at different stocking densities

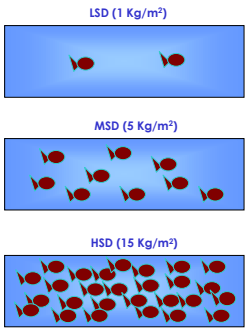
Herrera[1], M., Ruíz-Jarabo[2], I., Hachero-Cruzado[1], I., Vargas-Chacoff[2], L., Amo[1], A., Mancera[2], J.M., Cordero[1], M.L.

[1] IFAPA Centro "Agua del Pino". Ctra. Cartaya – Punta Umbría. 21459 Cartaya (Huelva-España). *marcelino.herrera@juntadeandalucia.es*

[2] Departamento de Biología. Facultad de Ciencias del Mar y Ambientales. Universidad de Cádiz. Campus de Puerto Real. 11510-Puerto Real (Cádiz-España).

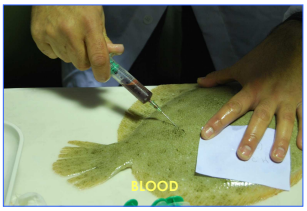
ABSTRACT The effects of the stocking density on the physiological stress and biometric features of the brill were studied. Fish were cultured at three different stocking densities: 1; 5 and 15 Kg m^{-2} (LSD, MSD and HSD) during 5 weeks. Survival and several biometric, feeding and plasmatic parameters were assessed. Although final weight and specific growth rate decreased in higher densities, there were not significant differences between MSD and HSD. Differences for survival rate, feed efficiency, conversion index and feed intake were not detected among treatments. The minimum HSI was found in the HSD treatment, and condition factor varied inversely regards to stocking density. Plasma cortisol and osmolality were directly related to stocking density though the former was not significantly different among treatments. Plasma lactate and glucose significantly increased while stocking density rose.

THREE STOCKING DENSITIES



Initial weight/length: 491±20 g / 31.5±0.41 cm
Through-flow system
Rectangular tanks (treatment per duplicates): 5000 L; 4.2 m^2
T= 20 ° C (plate heat exchange)
Dissolved oxygen > 5 mg L^{-1} (air stones)
Feeding: *ad libitum* (R Europa 22)
Daily cleaning and collecting of remaining food
Culture time: 5 weeks

SAMPLING



Centrifugated
3 min – 4 °C – 4000 rpm

Plasma analysis
Glucose
Lactate
Triglycerides
Proteins
Cortisol
Osmolality

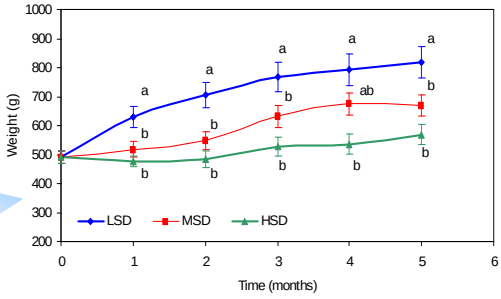
Specific Growth Rate: SGR (% day^{-1}) = $100 \cdot (\ln W_f - \ln W_o)/t$
Hepatosomatic Index: HSI = $100 \cdot (W_L / BW)$
Feeding Efficiency: FE = $(W_f - W_o) / FS$
Conversion Index: CI = 1/FE
Feed Intake: FI = mean(W_{-t}, W_o) / FC
Condition Factor: K = BW / TL^3

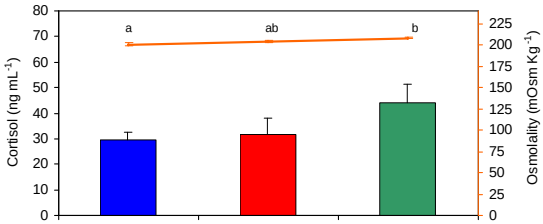
W_f, W_o and W_L are final, initial and liver weight; BW and TL, body weight and total length; t, time (days); and FS and FC are supplied and consumed food.

RESULTS

	LSD	MSD	HSD
Survival (%)	100	82.3±11.5	99.3
FW (g)	817.6±55.9 ^{a}	668.3±32.8 ^{b}	568.4±38.8 ^{b}
SGR (% day^{-1})	0.39±0.04 ^{a}	0.18±0.04 ^{b}	0.1±0.07 ^{b}
HSI	1.97±0.16 ^{a}	2.25±0.21 ^{a}	1.44±0.17 ^{b}
FE	0.6±0.12	0.56±0.36	0.73±0.31
IC	2.42±0.47	1.08±0.29	1.47±0.62
FI	8.11±1.44	13.06±2.25	11.49±1.43
K	1.56±0.03 ^{a}	1.55±0.02 ^{ab}	1.47±0.03 ^{b}

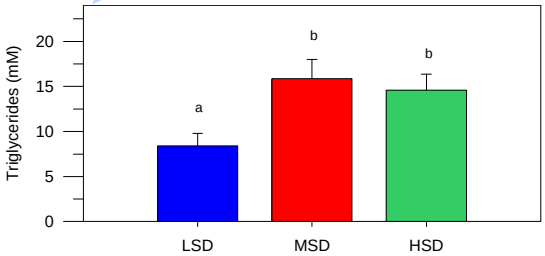
No differences in survival
Better growth for LSD (reduction of SGR and K with stocking density)
Lower HSI for HSD probably due to a poor accumulation of reserves



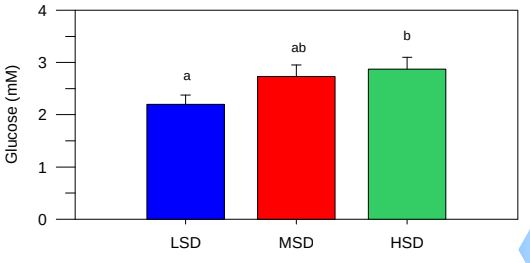


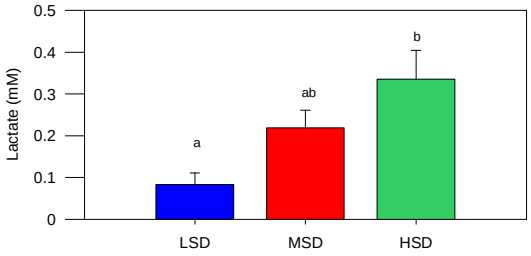
Plasma cortisol did not vary among treatments so it is possible that a chronic stress situation happened

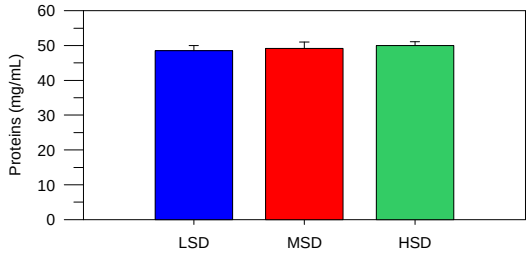
Triglycerides followed a similar trend to glucose and lactate but there was not differences between HSD and MSD



Plasma lactate and glucose showed a linear relationship with stocking density, suggesting mobilization of energy substrates to cope with any stress process.







Proteins did not vary among treatments so these do not seem to be important as energy substrates in brill crowding stress

CONCLUSION The brill showed a clear secondary response to crowding stress through the mobilization of some energy substrates. No changes in plasma cortisol were registered among stocking densities, probably due a chronic stress situation. All these physiological features evoked a reduction in the growth and other biometric parameters.

Instituto de Investigación y Formación Agraria y Pesquera
CONSEJERÍA DE AGRICULTURA Y PESCA

Unión Europea
Fondo Europeo de Desarrollo Regional
Invertimos en su futuro